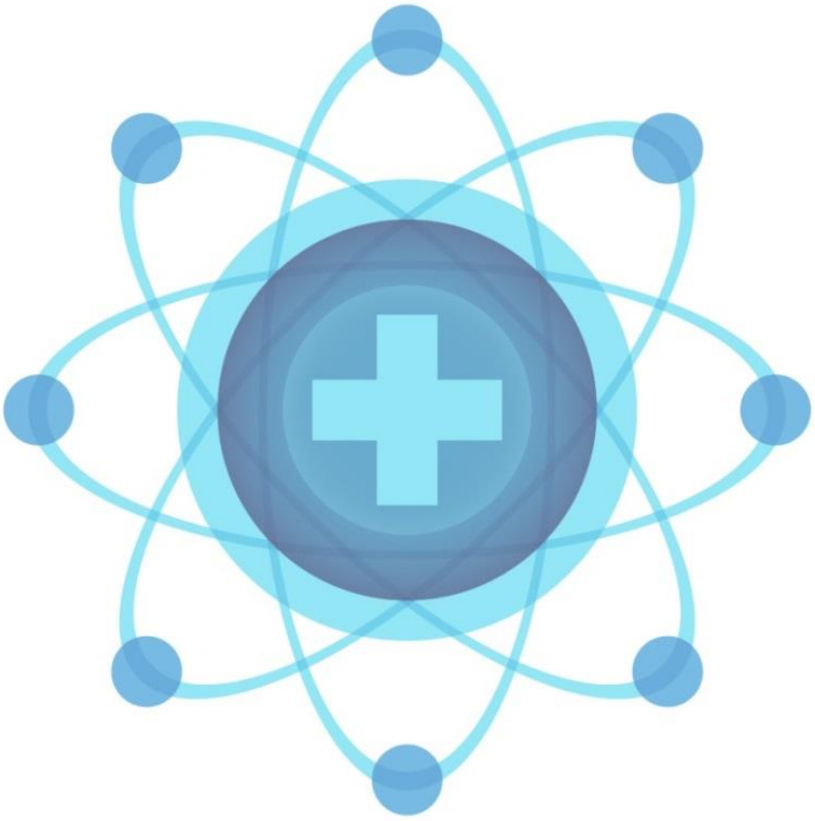

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Optimization of approaches to early phenotypic diagnosis and algorithm for differentiated management of patients with chronic obstructive pulmonary disease

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Abstract: Carrying out a questionnaire for the detection of COPD and evaluation of the CAT test, screening functional tests (6-second test, Stange test and Genche test) and a test for the state of mucocic clearance makes it possible to form in specialists, groups of COPD patients with varying degrees of severity of obstructive ventilation disorders, determine the impact of the disease on the patient's health and, by the ratio of quantitative assessments, divide patients into phenotypic types of the disease that coincide with the GOLD recommendations (2017), choose the right therapy for each individual based on the GOLD recommendations and prevent unreasonable high-cost medical services.

Keywords: COPD, phenotypes, early diagnosis, differentiated management of patients.

The World Health Organization (WHO) classifies COPD as -diseases with a high increase in the socioeconomic burden on society, patients and their families, this is a conditionally high indicators of mortality and disability of patients in able-bodied grow, [8, p.72; 27, p. 15-54], as it has a steadily progressing characterflow with homein chronicrespiratory insufficiency and development of chronic pulmonary heart disease [2, p. 25-30; 16, p. 56-67]

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In economically developed countries of the world, early diagnosis of COPD is carried out in no more than 25% of cases, which reflects the widespread underdiagnosis of the disease, based on the diagnosis of the level and severity of functional disorders, which often cannot be used during the initial visit to the doctor [1,2] .

The extremely low use of screening tests, including the use of validated questionnaires and screening functional tests - 6-second test, Stange's test and Genche's test, allowing to suspect an obstructive component, remains a major "gap" in the early diagnosis of COPD.

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death worldwide [3]. COPD is a chronic disease in which a large number of patients have exacerbations - acute worsening of respiratory symptoms requiring changes in treatment. Exacerbations are considered a serious problem, as frequent and severe exacerbations of COPD are associated with a poor survival outcome [2].

In 2017, the Global Initiative on COPD (GOLD) report improved the ABCD scoring tool to use only respiratory symptoms and exacerbations to categorize ABCD [4] . It is recommended that they be evaluated as a basis for pharmacological treatment of stable COPD.

The research practice is based on approaches that determine the level of validation of the diagnostic significance of the questionnaire, screening functional tests (6-second test, Stange test and Genche test) in relation to the severity of obstructive disorders, assessment of mucociliary clearance (saccharin test) in relation to the history of exacerbations (the number and need for hospitalization of the patient), assessment of the degree of influence of chronic obstructive pulmonary disease on the daily life and health of the patient, as well as the ratio of the obtained estimates with the nature of the disease phenotype (A, B , C , D) in accordance with the recommendations of GOLD (2017), which are aimed at differentiated selection of therapy and prevention of unreasonable high-cost medical services.

Sensitivity, Specificity, and Diagnostic Value of the COPD Detection Questionnaire for General Practitioners (Chronic Airways Diseases A guide for Primary Care Physicians, 2005), which allows converting the patient's answers into quantitative characteristics and correlating them with the alleged diagnosis of COPD,

and functional impairment of respiratory function within the "gold standard" is presented in Table 1. The diagnostic value of the questionnaire under consideration, calculated by the ratios of the parameters (A + D) / (A + B + D + C), amounted to 95.8%.

Table 1.

Sensitivity, Specificity, and Diagnostic Value of the COPD Detection Questionnaire for General Practitioners

	COPD according to the criteria of the "gold standard" FEV $_1$ /FVC ≤70% and FEV $_1$ ≤80%		
	There is	No	
Diagnostic probability threshold for COPD with 17 or more points	358 A	25 IN	**Diagnostic sensitivity** - the proportion of a true positive test among patients A / (A + C) - 95.5%
Diagnostic probability threshold for COPD at 16 or less points	17 WITH	600 D	**Diagnostic specificity** - the proportion of a true negative test among healthy D / (V + D) - 96.0%

Considering the frequency of positive results of the questionnaire to the degree of obstructive disorders, its high diagnostic value was noted, which allows diagnosing COPD in the early stages of the disease (Table 2).

Table 2.

Correlation between diagnostic threshold and functional indicators

	Functional class of COPD disease			
	FEV $_1$ ≥80%, n=34	50%<FEV $_1$ <80% , n=53	30%< FEV $_1$ <50% , n=153	FEV $_1$ <30%, n=135
Diagnostic probability threshold for COPD >95% (17 or more points)	25(73.5%)	48(90.5%)	150(98.0%)	135(100%)
Diagnostic probability threshold for COPD <95% (16 points or less)	9(26.5%)	5(9.5%)	3(9.5%)	-

duration tests, maximum inspiratory breath-holding tests, and maximum expiratory breath-holding tests in the provision of medical services at the primary care level can significantly improve the quality of diagnosing obstructive disorders. It was noted that with the severity of obstruction, the incidence of positive screening tests increases: from 76.5% to 100% for the Stange test, from 85.3% to 100% for the Gench test, and from 94.1% to 100% for 6 second test. An assessment of the ratio of the criterion of the "gold" standard of obstructive disorders with the number of positive functional screening tests showed a high frequency of three positive test samples in confirming obstruction and the degree of its severity from 88.2% to 100%.

The assessment of sensitivity, specificity and diagnostic value of screening functional tests is compared with the results of functional disorders within the framework of the "gold standard" for diagnosing COPD, presented in Table 3.

Table 3

Sensitivity, specificity and diagnostic value of screening functional tests for diagnosing COPD, %

	Positive screening functional tests		
	6 second test	Stange test	Genche test
Diagnostic sensitivity	94.7	92.8	89.3
Diagnostic specificity	96.0	94.4	91.2
Diagnostic value	94.5	93.8	90.5

Based on the above results, a scoring scale for the results of functional screening tests was developed, reflecting their diagnostic threshold in the diagnosis of obstructive syndrome (Table 4).

Table 4

Scoring scale for indicators of functional screening tests in the diagnosis of obstructive disorders

Points	Diagnostic screening tests		
	6 second, sec	Bar test, sec	Genche test, sec
0	Less than 6	Over 40	Over 30
1	7 - 9	39 -3 0	29-25 _
2	10 - 11	29 - 25	2 4 -20
3	12 - 13	24 -2 0	19 -15
4	Over 14	Under 19	Less than 1 4

The use of this scale makes it possible to objectify the degree of functional disorders in screening programs for diagnosing obstructive diseases.

The summed quantitative assessment of the results of the validated questionnaire and the scoring of functional screening tests, reflecting the severity of obstructive disorders and correlating with the parameters of the "gold standard", emphasizes its high diagnostic accuracy (Table 5), where, with a total of 17-20 points, mild obstructive disorders were stated; with 21-23 points - moderate obstructive disorders; at 24-26 points - pronounced and more than 27 points - pronounced obstructive disorders.

Table 5

Diagnostic value of screening test approaches in the diagnosis of obstructive disorders

Options	Quantification of the results of the validated questionnaire and functional screening tests			
	18-20 points	21-23 points	24-26 points	Over 27 points
FEV_1, % of due	79.6±3.3	59.1±4.9	41.8±3.4	25.6±4.1

FEV_1 / FVC	66.6±2.7	63.9±4.7	60.6±3.7	60.1±5.7

The practice of managing patients with COPD is determined not only by early diagnosis approaches, but also to a greater extent by the number of exacerbations, the number of exacerbations requiring hospitalization, and the assessment of the impact of the disease on the patient's daily life and health. For the most part, these indicators are subjective, and the clinical features of the course of respiratory pathology do not always allow us to focus on the likelihood of a respiratory exacerbation and the reason for hospitalization from an exacerbation.

The results of our developments noted that the number of exacerbations, the number of exacerbations requiring hospitalization in patients with COPD correlates with a morphological marker - a violation of mucociliary clearance and the depth of its violations.

Comparing the frequencies of exacerbations and hospitalizations, a diagnostic threshold for the saccharin test of more than 25 minutes was determined, which correlated with the frequency of exacerbations more than 2 times a year and the number of hospitalizations required, and was also determined by the level of quantitative assessment of the validated questionnaire and functional screening tests characterizing the severity of respiratory obstructive disease (Table 6).

Table 6

Characteristics of indicators of the state of mucociliary clearance at different levels of the diagnostic threshold of obstructive disorders

Options	quantitative assessment of the results of the validated questionnaire and functional screening tests			
	18-20 points	21-23 points	24-26 points	Over 27 points
MCC, min	14.6±1.1	24.4±0.8	2 9.7±1.2	36.9±0.9

We calculated the diagnostic value of the parameter that determines the ratio of the result of the diagnostic scale, including the total score for diagnosing COPD to the result of the scale for assessing the impact of the disease on the patient's life (CAT). This is an integrated indicator that characterizes a certain status of the patient through the prism of clinical manifestations of the severity of the disease to assess the degree of influence of the disease on the patient's life (Ind - Pd / Psat). The ratio was used to determine indicators Ind > 1.2 - clinical manifestations of the disease, prevailing over the parameter - the impact of the disease on the patient's life (respiratory symptoms and the unexpressed impact of the disease) and Ind ≤1.2 - the pronounced impact on the patient's life (respiratory symptoms and the pronounced impact of the disease).

The correlation of the obtained scores with the nature of the disease phenotype (A, B, C, D) in accordance with the GOLD recommendations (2017), taking into account the parameters of the state of mucociliary clearance and integrated indicators of the clinical manifestations of the disease to assess the impact of the disease on the patient, made it possible to generalize the patient's status by the phenotype of the

disease, where A - COPD patients with clinical manifestations of the disease, which have an unexpressed effect of the disease on the patient's life (Ind > 1.2) and without a pronounced violation of the morphological marker of mucociliary clearance, determined by the absence of an exacerbation or its exacerbation no more than 1 time per year;

C – COPD patients with clinical manifestations of the disease, which have a pronounced effect of the disease on the patient's life (Ind ≤1.2) and without a pronounced violation of the morphological marker of mucociliary clearance, determined by the absence of an exacerbation or its exacerbation no more than 1 time per year;

C - COPD patients with clinical manifestations of the disease, which have an unexpressed impact of the disease on the patient's life (Ind > 1.2) and with a pronounced violation of the morphological marker of mucociliary clearance, exacerbations are determined 2 or more times a year, as well as more than 1 year of hospitalization in year.

D - COPD patients with clinical manifestations of the disease, which have a pronounced effect of the disease on the patient's life (Ind ≤1.2) and with a pronounced violation of the morphological marker of inflammation, exacerbations are determined 2 or more times a year, as well as more than 1 hospitalization per year .

Determination of the phenotype of the disease in relation to the clinical manifestations of the disease, its impact on the life of the patient and the severity of the morphological marker was compared with the recommended phenotypes by GOLD (2017). It was noted that out of 112 patients with the GOLD phenotype D , 110 patients (98.2%) had the D phenotype verified according to our modified diagnostics; out of 98 patients with phenotype C, in 100 patients (102%). For phenotypes B and A according to GOLD , 100% coincidence of diagnostic significance was noted.

Conducting a questionnaire and assessing the CAT test, screening functional tests (6-second test, Stange test and Genche test) and a test for the state of mucocic clearance allows forming a group of COPD patients with varying degrees of severity of obstructive ventilation disorders among specialists, to determine the impact of the disease on the patient’s health and by the ratio of quantitative assessments, divide patients into phenotypic types of the disease that coincide with the GOLD recommendations (2017), choose the right therapy for each individual based on the GOLD recommendations , and prevent unreasonable high-cost medical services (Table 7).

Table 7

Treatment regimens according to disease phenotype.

	Therapy: DDAHP and acetylcysteine	*Therapy: DDAHP + ICS/LABA and acetylcysteine/antibiotic*
	C-persons of COPD with clinical manifestations of the disease that have a pronounced effect of the	D - COPD patients with clinical manifestations of the disease that have a pronounced effect of the disease on

MCC more than 25 min	disease on the patient's life (Ind > 1.2) and with a pronounced violation of the morphological marker of inflammation, exacerbations are determined 2 or more times a year, as well as more than 1 hospitalization per year (100 patients)	the patient's life (Ind ≤1.2) and with a pronounced violation of the morphological marker of inflammation, determined by exacerbations 2 or more times a year, as well as more than 1 hospitalization per year (110 sick)
MCC less than 25min	A-COPD patients with clinical manifestations of the disease that have an unexpressed impact of the disease on the patient's life (Ind> 1.2) and without a pronounced violation of the morphological marker of inflammation, determined by the absence of exacerbation or its exacerbation no more than 1 time per year (75 patients)	B - COPD patients with clinical manifestations of the disease, which have a pronounced effect of the disease on the patient's life (Ind ≤1.2) and without a pronounced violation of the morphological marker of inflammation, determined by the absence of exacerbation or its exacerbation no more than 1 time per year (90 patients)
	Ind >1.2	Ind≤1.2 _
	Therapy: SABA or KDAHP	*Therapy with LABA or DACP*

Considering the provision **on medical effectiveness**, which is evaluated by the formula:

$$Km = \frac{\text{Number of cases of medical outcomes achieved}}{\text{Number of cases evaluated}}$$

we can state that the indicator of medical effectiveness is 0.98-1.0.

Conclusions:

1. The evaluation of the obtained results reflects that the diagnostic value of the considered questionnaire was 95.8%, functional screening test approaches in the diagnosis of obstructive disorders from 90.5-94.5% and in the presence of 3 positive functional screening test approaches increases to 93.9%.
2. The developed and proposed algorithm for the management of COPD patients at the level of primary health care facilities, including approaches to screening diagnosis of chronic obstructive pulmonary disease, identification of obstructive and morphological disorders, as well as an assessment of the degree of influence of chronic obstructive pulmonary disease on the daily life and health of the patient, is aimed at early diagnosis, determination of the management of chronic obstructive pulmonary disease, a strategy for preventing the progression of the disease, which will prevent expensive medical costs.

Literature:

1. Zaitsev A.A., Kryukov E.V. Practical Pulmonology, 2017, - No.4, P.58-62.
2. Chuchalin A. G., Avdeev S. N. et al. Chronic obstructive pulmonary disease: federal clinical guidelines for diagnosis and treatment. Pulmonology. 2022; 32(3): 356–392. DOI: 10.18093/0869-0189-2022-32-3-356-392

3. https://www.who.int/ru/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)/
4. Vogelmeier C.F., Criner G.J., Martinez F.J. and etc. Report on the Global Strategy for Diagnosis, Treatment and Prevention of Chronic Obstructive Pulmonary Disease 2017: GOLD summary. J. Eur Respir 2017; 49 :1700214.